

ABSTRACT

Iron-manganese-silicon-based shape memory alloys comprising:

- (a) an effective amount of Mn greater than about 18%;
- (b) an effective amount of Si greater than about 5%;
- (c) from about 1% to about 8% Cr;
- (d) an effective amount of N; and
- (e) the balance of Fe.

Preferably, the alloys comprise from about 20% to about 30% Mn, from about 5.5% to about 6% of Si, from about 2% to about 5% of Cr, from about 0.1% to about 0.5% N, and from about 61% to about 70% Fe. Preferred embodiments demonstrate about 100% shape recovery with one cycle of thermo-mechanical training with a prestrain of about 3%. Methods for training the alloys are provided, comprising the steps of tensile deforming samples by applying 3.0% or 3.5% prestrain at room temperature, heating each sample to approximately 600°C, and then cooling them after keeping them at this temperature for 10 minutes.